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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/529,362

03/28/2005

Toshiaki Kakemura

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EXAMINER

BURKHART, ELIZABETH A

ART UNIT

PAPER NUMBER

1715

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/529,362	Applicant(s) KAKEMURA ET AL.	
	Examiner ELIZABETH BURKHART	Art Unit 1715	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3 and 5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3 and 5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/8/2010 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al (JP 2000-255579) in view of Ingle et al (US 2004/0083964) and Namiki et al (US 2002/0122897).

Ito teaches a thin film forming method for plasmatizing a mixture gas, the mixture gas consisting of a monomer gas (HMDSO, TEOS) [0036] and an oxidizing reactive gas (oxygen). The thin film deposited is silicon oxide. The flow amount ratio of the monomer gas with respect to the oxidizing gas is varied during deposition (Claim 1 from machine translation). The flow amount ratio decreases continuously while forming a first thin film (Claim 2). Ito also teaches a second step of forming a thin film by increasing the flow

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amount ratio after the first film is formed (Claim 3). Ito further teaches an initial value of the flow amount ratio may be 0.05 (Table 1). Since Ito discloses decreasing the concentration of the monomer gas (Claim 1) and an initial flow ratio of 0.05 (table 1), the flow ratio would be 0.05 or lower within 2 to 5 seconds. Further, it would have been obvious to vary the flow ratio by gradually reducing the amount of monomer gas while the amount of oxidizing gas is maintained at a substantially fixed level because Ito discloses that the concentration of the monomer gas is varied, i.e. decreased (Claims 1 and 2) and the mixture ratio of monomer to oxidizing gas is varied [0042].

Ito does not disclose forming the final thin film wherein the flow amount ratio reaches 1000 or more by increasing the supply of monomer gas and decreasing the supply of reactive gas or that the forming lasts for 1 to 3 seconds.

Ingle discloses forming a silicon oxide film exhibiting high conformality wherein initially a low flow amount ratio of precursor (TEOS) to oxidizing gas (ozone, oxygen [0091]) is used and such ratio is increased in order to increase throughput (Abstract). The ratio may be changed by increasing the flow rate of precursor and reducing the flow rate of oxidizing gas at constant speeds [0094].

Namiki discloses a thin film forming method for depositing a gas-barrier film of silicon oxide wherein a mixture gas of monomer (e.g. HMDSO) and reactive gas (e.g. oxygen) is plasmatized to form the film [0091]-[0092], [0119]-[0122]. The time for treatment with the plasma depends on the thickness of the film to be formed and is not shorter than 1 second, but a short time is preferred from the viewpoint of cost [0101].

It would have been obvious to one of ordinary skill in the art at the time of

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invention by applicant to increase the flow ratio of Ito after a first film of high conformality is formed by increasing the flow rate of precursor as suggested by Ingle in order to allow for high throughput. Since Ingle discloses that the ratio is increased by increasing the precursor flow rate and reducing the oxidizing gas flow rate [0094] and that the relative percentage of precursor in the process gas is increasing, it would have been obvious to adjust the ratio to a desired value, including values within the claimed range, in order to reach a desired throughput. Further, it would have been obvious to form the final film of Ito and Ingle for a desired amount of time, including values within the claimed range, in order to achieve a desired thickness as suggested by Namiki.

Thus, claims 1 and 3 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Ito, Ingle, and Namiki.

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al (JP 2000-255579)) in view of Ingle et al (US 2004/0083964) and Namiki et al (US 2002/0122897) as applied above and further in view of Verzaro et al ('497).

Ito further teaches forming the plasma by supplying high frequency power to an electrode (Abstract, [0040]). Ito does not teach controlling reflected power to be 10% or lower than the supplied high frequency power.

Verzaro teaches a plasma CVD method of depositing silicon oxide by plasmatizing a mixture gas, said mixture gas comprising HMDSO and oxygen (Col. 5, lines 17-20, Col. 4, lines 1-5). The plasma is formed by supplying high frequency power to an electrode through an impedance matching network. The reflected power is controlled to be 10% or lower than the supplied high frequency power in order to obtain

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a maximum efficiency in respect of the power supplied to the plasma (Col. 4, line 55-Col. 5, line 4).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to control the reflected power in the process of Ito as suggested by Verzaro in order to obtain a maximum efficiency in respect to the power supplied to the plasma.

Thus, claim 5 would have been obvious within the meaning of 35 USC 103 over the combined teachings of Ito, Ingle, Namiki, and Verzaro.

Response to Arguments

4. Applicant's arguments filed 12/8/2010 have been fully considered but they are not persuasive. Applicant argues that Ingle discloses the formation of the film in a time frame of 20-120 seconds or 50-350 seconds and does not disclose that formation of the final film lasts for 1 to 3 seconds. The examiner previously argued that it would have been obvious to one of ordinary skill in the art to form the film of Ingle under the second condition (i.e. increased ratio) for a desired amount of time, including values within the claimed range, in order to produce a film of desired thickness. Namiki (US 2002/0122897) provides evidence for the previous position (see rejection above).

Applicant argues that Ingle does not disclose that the supply of monomer gas increases at constant speed while the amount of reactive gas decreases at constant speed such that the amount of mixture gas is maintained at a substantially fixed level. The Examiner disagrees. Ingle discloses that increasing the percentage of TEOS in the gas mixture may be accomplished by increasing the flow of monomer gas, reducing the

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flow of oxidizing gas, **or any combination of a change in flow of the components in the gas mixture which results in a change in overall percentage of monomer gas** [0094].

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELIZABETH BURKHART whose telephone number is (571)272-6647. The examiner can normally be reached on M-Th 7-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Elizabeth Burkhart/
Examiner, Art Unit 1715